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**FAX MACHINE FOR A COMPUTER NETWORK
SUCH AS THE INTERNET**

The invention concerns fax machines and more particularly fax machines designed to communicate with corresponding fax machines across a computer network such as the Internet.

On the Internet, communications between fax machines which each have an electronic address, are generally performed by electronic mail, the latter containing a header and a fax. The mail header has in particular a destination field containing the electronic address to which the mail is to be sent, and a source field containing the originator address of the mail.

The present invention aims to facilitate correspondence between Internet fax machines, and more generally between the fax machines of a computer network.

To this end, the invention concerns a fax machine designed to be connected to a telephone network and to communicate with corresponding fax machines across a computer network of the Internet type, the fax machines each having an electronic address on the aforesaid computer network, characterised by the fact that it has memory means for storing a record of the fax machine communications with corresponding fax machines, containing the electronic addresses of the aforesaid corresponding fax machines, means for managing the record, for extracting the electronic addresses and associating them with the corresponding fax machines and means for asking a corresponding fax machine for its electronic address, during a communication with the aforesaid corresponding fax machine across the telephone network, the aforesaid means for managing the record being designed to enter the aforesaid electronic address of the corresponding fax machine into the record.

Thanks to this arrangement, in order, for instance, to send a fax to a fax

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machine whose address is contained in the record, all that needs to be done is to extract that address from the record and to send the fax to that address, thus associating the address with that corresponding fax machine.

Advantageously, means being provided to receive a fax transmitted from a corresponding fax machine across the aforesaid computer network and associated with the electronic address on the computer network of the said corresponding fax machine, the means for managing the record are organised to enter the electronic address of the aforesaid corresponding fax machine into the record, upon receipt of the fax.

More advantageously, means being provided to send to a corresponding fax machine, via the computer network, a fax associated with the electronic address on the corresponding fax machine's computer network, the means for managing the record are organised to enter the electronic address of the aforesaid corresponding fax machine into the record prior to sending the fax.

The invention will be better understood with the aid of the following description of a particular embodiment of the fax machine of the invention, with reference to the appended drawing in which:

- figure 1 represents an operational block diagram of the fax machine of the invention and
- figure 2 represents a diagram of the networks to which the fax machine in figure 1 is connected.

The fax machine of the invention 14 is able to communicate with corresponding fax machines such as the fax machine 15 shown in figure 2, across a telephone network, in this case the switched telephone network STN 100, as well as across the Internet network 101. It therefore has the capacity to communicate on the Internet and has an Internet address.

The words "Internet address" are intended to indicate an electronic address on the Internet network and, by definition, a fax machine is called an "Internet fax machine" when it has the capacity to communicate across the Internet and has an Internet address.

The fax machine 14 comprises, in the classic manner, a modem 1 for connecting to the STN network 100, a sending and receiving unit 2, a sending memory 3, a receiving memory 4, a fax preparation unit 7, fax reconstruction unit 8 and a man-machine interface unit 12. The unit 2 is connected to the modem 1, the unit 7 to the sending memory 3 and the unit 8 to the receiving memory 4.

The sending and receiving unit 2 is provided for sending and receiving faxes, either by the Internet 101, or by the STN network 100. For sending and receiving a fax via the Internet 101, unit 2 is organised for connection to the Internet 101 in this case by executing a telephone connection protocol with an access provider 20 to the Internet 101, prior to the dispatch or receipt of the fax. For sending and receiving a fax via the STN network 100, unit 2 is organised, in the classic manner, to execute a capacity interchange protocol with the corresponding fax machine 15 prior to fax transmission, in accordance with the fax protocol T30.

The sending memory 3 and the receiving memory 4 are intended to hold faxes to be sent and faxes received.

The man-machine interface unit 12 consists of a data entry keyboard, a display screen and man-machine interface software for the purpose of displaying on the screen a graphic interface comprising context-sensitive menus for using the fax machine 14.

The fax preparation unit 7 comprises an image analyser, a word processing

application and an electronic mail preparation application.

A reminder here that electronic mail transmitted on the Internet 101 has a header and perhaps a fax. The header comprises several information fields and in particular, a destination field containing the Internet address of the mail destination and a source field containing the Internet address from which the mail is being sent. In the case of electronic mail containing a fax, the fax is thus associated with the information contained in the header fields of the mail, and in particular with the Internet destination address.

The unit 8 comprises a printer and an application for displaying the faxes received on the screen.

An encoder 5 and a decoder 6 are provided for encoding the faxes to be sent via the Internet 101 and for decoding the faxes received via the Internet 101 respectively, in accordance with the standard MIME protocol for communication on the Internet 101.

The fax machine 14 also has a memory 10 for storing a record 11 of communications of the fax machine 14 with corresponding fax machines. The memory 10 is connected to a unit 9 for managing the record 11.

Finally, there is a unit 13 for controlling the fax machine 14, in this case a microprocessor, to which all the parts of the fax machine 14 are connected.

The communications record 11 and the management of that record by unit 9 will now be described in greater detail.

The record 11 consists of a stack of items, each associated with a corresponding fax machine and containing the following fields:

- an "Internet address" field to contain the Internet address of the corresponding fax machine,

- a "name" field to contain data for identifying the corresponding fax machine, explained later, and
- a "telephone number" field to contain if appropriate a telephone number on the STN telephone network 100, or on another telephone network such as the integrated services digital network ISDN, of the corresponding fax machine.

A fax machine Internet address comprises a name followed by the symbol @ (meaning "at") then the address of a server and is thus in the form <name> @ <server address>. The name identifies the fax machine to a server, which is generally owned by the fax machine's Internet access provider. The words "identification data" are therefore intended to indicate the name which precedes the symbol @ in an Internet address.

The stack of the record 11 is circular and its items are classified chronologically by the management unit 9. The oldest and the most recent parts of the stack 11 are placed at the rear and at the head of the stack respectively. In addition, since the memory 10 has a limited storage capacity, the number of stack items is consequently also limited so that, when the memory 10 is full, i.e. when the number of items of the stack 11 containing an Internet address is at maximum, then each time a new item is entered into the stack 11, the management unit 9 erases and replaces the oldest item in the stack 11 by the new item.

Different cases of entry of a new item into the stack 11 will now be explained.

Sending a fax via the Internet to a corresponding fax machine

In order to send a fax to a corresponding fax machine, for example fax machine 15, via the Internet 101, the fax preparation unit 7, under the control of an operator, prepares the fax, in this case by analysing a fax image, and appends it, in a mail, to the header of the electronic mail containing the

electronic address of the corresponding fax machine 15, in the destination field. With the aid of the keyboard and the graphic interface displayed on the screen, the operator enters, manually in this case, the Internet address of the corresponding fax machine 15 to fill the destination field of the mail.

Prior to sending the fax-mail (that is the mail containing the fax), the management unit 9 reads the content of the mail's destination field, enters and copies the Internet address of the corresponding fax machine 15 contained in this field into the "Internet address" field of a new item of the record stack 11, extracts the name of the corresponding fax machine 15 from this Internet address and records it into the "name" field of the new item of the stack 11.

Receipt of a fax sent via the Internet from a corresponding fax machine

Upon receipt of a fax-mail sent via the Internet 101 from a corresponding fax machine, in this case fax machine 15, the management unit 9 reads the content of the source field of the header of the mail received and enters the address contained in that field, in other words the Internet address of the corresponding fax machine 15, into the "Internet address" field of a new item of the stack of the record 10[sic], extracts the name from the Internet address of the corresponding fax machine 15 and enters it into the "name" field of the new stack item.

Telephone call to a corresponding fax machine

In order to send a fax to a corresponding fax machine, in this case fax machine 15, via the STN network 100, the operator enters the telephone number of the corresponding fax machine 15, in this case using the keyboard, the unit 2 calls that number, establishes a telephone communication with the corresponding fax machine 15 and, prior to sending the fax in accordance with the T30 protocol, executes a capacity interchange protocol with the

corresponding fax machine 15. During this capacity interchange protocol, the fax machine 14 asks the called fax machine 15, using a T30 protocol frame, whether it has the capacity to communicate on the Internet and, if so, asks for its Internet address.

Where the corresponding fax machine 15 is an Internet fax machine, the two fax machines mutually inform each other that they are capable of communicating on the Internet and interchange their respective Internet addresses in protocol frames. The management unit 9 records the telephone number of the corresponding fax machine 15, previously entered by the operator, into the "telephone number" field of a new item of the stack 11, and the Internet address of the corresponding fax machine 15, transmitted and received, into the "Internet address" field, then extracts the name from this Internet address and records it in the "name" field of the new item of the stack 11.

It is likewise possible to envisage that the fax machine 14 calls a corresponding fax machine 15 via the STN network 100 specifically to ask it for its Internet address, during a capacity interchange protocol.

Telephone call from a corresponding fax machine

When the fax machine 14 is called via the STN network 100 by a corresponding fax machine of the Internet 101, in this case fax machine 15, for transmission of a fax across the STN network 100, as previously described, the two fax machines execute a capacity interchange protocol during which the corresponding fax machine 15 transmits its Internet address to the fax machine 14.

The management unit 9 of the fax machine 14 records the Internet address, transmitted and received, of the corresponding fax machine 15, into the "Internet address" field of a new item of the stack 11, extracts the name from this address and records it into the "name" field of the new item. The fax

machine 14 being in this case a subscriber to a service such as the CLASS service of France Télécom, this service supplies it with the telephone number of the calling fax machine 15 and the management unit 9 records this number into the "telephone number" field of a new item of the stack of the record 11.

Instead of being supplied by the CLASS service, the telephone number of the corresponding fax machine could be transmitted by a frame of the fax interchange protocol, for example a TSI frame of the T30 protocol.

The fax machine 15 could equally call the fax machine 14 via the STN network 100, specifically in order to effect a mutual exchange of Internet addresses.

The management unit 9 allows the operator to consult the items of the stack 11, by displaying the latter on the screen, to extract the Internet address of a corresponding fax machine in order in particular to send a fax to that corresponding fax machine, across the Internet 101, thus associating the Internet address extracted with that corresponding fax machine. In the same way the operator can extract from the stack a telephone number to call a corresponding fax machine by the STN network 100, thus associating the Internet address with this corresponding fax machine.

In a more developed variation of the fax machine, varying from the preceding description only in what is now about to be described, for each new Internet address of a corresponding fax machine, associated with a fax received or with a fax sent via the Internet 101, or transmitted by the STN network 100 during a capacity interchange protocol with a corresponding fax machine, the management unit extracts the name from the new Internet address and compares it with the names held in the "name" fields in the record stack.

Where the name extracted from the Internet address is not held in any item of the stack, the management unit records it, together with the Internet address,

into a new stack item, as previously explained.

Where the name extracted from the Internet address is already held in a pre-existing item of the stack and is thus already associated with an Internet address in the record, the management unit compares the new Internet address with that of the pre-existing stack item. If this is identical, the management unit does not record the new Internet address. If it is not identical, the management unit, by displaying a request on the fax machine screen, asks the fax machine operator whether he wishes to replace the address held in the pre-existing item of the stack with the new address and, if so, replaces the former Internet address with the new one.

Instead of inputting the Internet address or the telephone number of the corresponding fax machine by means of the key board, it could be arranged for this number to be read from a memory storing a list of correspondents containing the identities of corresponding fax machines associated with their telephone number and their Internet address. In that case, the fax machine will possess such a memory storing a list of correspondents and a management unit for that memory for the purpose of managing entries, and updating the list.

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